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THE SYSTEMS OF THE HUMAN BODY.

LOUISIANA ARTS AND SCIENCE CENTER, BATON ROUGE

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REPORTED IS A UNIT ON THE "SYSTEMS OF THE HUMAN BODY" DEVELOPED BY THE LOUISIANA ARTS AND SCIENCE CENTER TO BE TAUGHT TO CLASSES PRIOR TO A VISIT TO THE CENTER. THE UNIT INTRODUCES THE STUDENT TO A GENERAL KNOWLEDGE OF THE HUMAN BODY. IT FOLLOWS A LOGICAL ORGANIZATION WORKING FROM CELLS TO ORGAN SYSTEMS. EACH SYSTEM IS STUDIED SEPARATELY, BUT THE CONCEPT OF INTERDEPENDENCY OF SYSTEMS IS DEVELOPED THROUGHOUT. INCLUDED IN THE UNIT ARE (1) DISCUSSION QUESTIONS ON EACH SECTION INCLUDING BRIEF ANSWERS, (2) A VOCABULARY LIST, (3) A BIBLIOGRAPHY FOR CHILDREN'S READING AND FOR TEACHER REFERENCE, (4) A LIST OF STUDENT ACTIVITIES, (5) LISTS OF CONCEPTS AND UNIT OBJECTIVES, (6) WORKSHEETS AND/OR RELATED QUESTIONS, (7) TEACHING SUGGESTIONS, AND (8) A LIST OF RELATED FILMS AND FILMSTRIPS. (DS)

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THE SYSTEMS OF THE HUMAN BODY

LOUISIANA ARTS AND SCIENCE CENTER

THE SYSTEMS OF THE HUMAN BODY

Overview

It is the idea of this unit to introduce to the student a general knowledge of the human body. The student is made aware of the advances that have been made.

The cell, as the basic building block of the body, is discussed. The student is led to see how cells form tissue; tissue forms organs; and organs work together to form the systems of the human body. Each system is studied separately with its various organs and their functions. The student is continually made aware of how each system is dependent upon the others, and how all systems work together to keep the body alive and healthy. By use of student participation, the individual differences found in a class may be expressed. The student can choose the project in which he is interested, and the above-average student, hopefully, will be challenged. The teacher may want to assign difficult projects to those in need of challenge. Some activities might be given to the entire class.

Included in this unit are:

1. Questions on each section. Brief answers are given to save the teacher time.
2. Vocabulary list
3. Bibliography for children's reading and for teacher reference
4. List of student activities to be done during the appropriate class discussions if the teacher so desires.
5. List of concepts
6. Worksheets and/or related questions
7. List of related films and filmstrips

It is suggested that this unit be taught prior to a visit to the Arts and Science Center, at which time special attention be given to "Valentina," the transparent medical figure.

General Concepts

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General Concepts

1. The body is a well-ordered machine.

2. The body is composed of billions of cells.

3. Cells differ in the types of work they do.

4. A group of cells, all the same kind, that performs a particular kind of work, is called a tissue. Example: Groups of cells that transmit impulses back and forth from the brain to other parts of the body make up nerve tissue.

5. When different kinds of tissue are organized to perform a particular kind of work within a body, the tissues form an organ. Example: An eye is an organ that performs the function of seeing.

6. Organs of the body are organized into unified systems. Example: Each system performs a particular task for the body--the digestive system, which includes the mouth, teeth, tongue, gullet, stomach, intestines and many glands, performs the function of digesting food.

7. Although each system has its own special job, all the systems work together to keep the body alive and functioning properly.

Objectives for the Human Body Unit

A. Understandings

1. To acquire a basic knowledge of the systems of the human body.

2. To appreciate the complex workings of our organs and systems.

3. To realize the need for taking care of our body.

4. To be stimulated to further study in the field of biology.

5. To promote scientific investigation and methods for finding the solutions to problems and questions.

B. Skills: The students who have participated in the various activities of this unit should have increased their skills in:

1. Interpreting information

2. Using various reference works.

3. Communicating effectively with others.

4. Using scientific tools and methods in research.

5. Comparing and analyzing information.

6. Giving oral reports--accurate communication.

Introduction

Materials: Pictures of Vesalius
Galen's Body
Visible man
Heart, reproduction, skeleton.

Plastic body with movable organs
Works of Michaelangelo and Leonardo da Vinci
Miniature skeleton

Procedure

Begin by asking the class if they have ever heard of Michaelangelo or Leonardo da Vinci. After they have decided that these men were great artists show several of their works depicting the human body as a work of art. Then ask the class if they have any idea what these men might have to do with a science class. Explain that these artists could not draw the surface features of the body without knowing what was underneath. Use the following background material to impress upon the students how today scientific study (finding the answer to "why" by investigation), is encouraged, but in years long past curiosity was looked upon and treated as something criminal and sinful.

Background Information

Legend has it that Michaelangelo, even though the crime was punishable by death, wanted to know what was under the surface of the human body so badly that he robbed graves to obtain bodies. Then, in the still of night, he cut them up and learned the secrets that enabled him to be one of the greatest sculptors and painters.

Just as Michaelangelo needed to know what was inside of the body of man, so did the physicians. From about the first century to the sixteenth, men of medicine followed the teaching of Galen, a Greek physician, who practiced in Rome (c. 130-200). His ideas were incorrect, but so dogmatic that they were believed. His misconceptions were due to the fact that his studies were primarily of dogs and chickens; dissection of the human body was forbidden in his day. (Show Galen's Complete System.)

Fourteen hundred years later, Vesalius (write name on board), came along. He was from Belgium and lived from 1514-1564. He was born twenty-two years after America was discovered. Vesalius obtained bodies from the municiple gallows outside the city, cutting them down while the city slept. (Show pictures of this.) With the aid of a trusted friend, he smuggled them through the town gates and across the deserted streets to his home. There, he did very careful dissections as a friend, an artist, drew what was found. It was their work that proved Galen wrong. Vesalius is known as the "Father of Anatomy."

Conclusion

Explain to the class that today we no longer need to steal bodies to learn about them. Tell them that now we have pictures, graphs, models, books, and cadevers from which to learn. (Pass around the models and pictures.) Inform them that doctors have their own cadaver while they are learning to dissect the human body.

After the children have finished looking at the materials, explain that they are going to learn many things about the human body in the next weeks, and that many of their questions will be answered. For instance, "Is the blood really blue?" "Why don't we stop breathing when we sleep?" or "What causes goose bumps?" Finish the introduction by scheduling a tour for the class to visit the Arts and Science Center to meet Valentina, the transparent lady.

The Louisiana Arts and Science Center extends a warm invitation to you and your class to visit the Center often.

STUDENT ACTIVITIES

General

1. Be responsible for a bulletin board containing news articles on the latest medical advances.

2. Report to the class about the medical beliefs and practices of the ancient Greeks, Egyptians, and Chinese. Compare and contrast ancient practices with modern ones.

Skeletal and Muscular

3. Beef is the muscle of steers. With a pin, pick apart a piece of roast beef. You will easily be able to separate it into long, thin strands that are fibers of muscle tissue. Place a very thin muscle fiber under a cover-glass upon a glass slide. You will then be able to see that muscle tissue is made up of spindle-shaped cells.

4. Using the eye as an example, explain to the class the difference between voluntary and involuntary muscles. Use a poster or some visual aid.

5. Make a cardboard model of two bones moved by muscles. Use rubber bands to do the work of the muscles.

6. Bring in a Hallowe'en skeleton and report to your class on the various bones in the body.

Digestive

7. By using an experiment show how foods get through the walls of the small intestine. (Science Experiments Book 5, Singer Science Series, p. 142.)

8. Find pictures of the stomach. Look in encyclopedias and other books for pictures. Make drawings of the stomach when it is empty and when it is full. Read to learn how long food normally remains in the stomach. Report to the class what has been learned. Use the drawings as a part of the report.

9. Report to the class on the experiments done by Lazzaro Spallanzani and digestion.

10. Find out what part the salivary glands play in digestion. Report to the class. Bring a cube of sugar for each person to dissolve in his mouth to help the class understand the concept of chemical change of food in the mouth.

Respiratory

11. Make a chart showing how many times one breathes a minute. Use ten students--five boys and five girls. Record when they are at rest and after they have run fifty yards. Explain the difference.

12. Explain to the class how air enters the blood stream and carbon dioxide leaves the blood in the lung.

13. By experiment prove that you breathe out carbon dioxide.

Circulatory

14. Make a chart showing the number of heartbeats per minute at rest of the following animals: hummingbird, mouse, chicken, rat, rabbit, cat, dog, sheep, pig, man, lion, horse, elephant.

15. Make a tape recording of your heart beating at rest and after you have just run for a few minutes. Play it for your class. If no recorder is available you may take your pulse and report to the class.

16. With the aid of a microscope examine a drop of blood and draw what you see. Report to the class.

17. Trace a drop of blood through the entire circulatory system. Use a poster to help the class follow your journey. Color the veins red and the arteries blue.

18. Read about Rene Laennec and report to the class about what was interesting in his life.

19. Using a diagram or model explain to the class how the heart works as a pump.

20. Get a beef, lamb, or pork heart from a butcher. Ask the butcher to leave the large blood vessels attached at the top of the heart. Float it in water to show how the valves work. Show this to the class.

21. Have each student in class count the number of "pumps" of their heart in one minute. Get a record of each and make a chart to show individual differences.

22. Report on the discoveries of William Harvey.

Nervous

23. Demonstrate to the class how the somatic portion of the peripheral nervous system works.

Reproduction

24. Make a chart showing the period of gestation for a mouse, rabbit, horse, man and an elephant. Now find a reference showing the average length of life of each of these animals of your chart. Report to your class on this.

25. Read to find out how various animals are reproduced and how the mother cares for her young. Collect pictures to show the class when you report on your findings.

Culminating

26. Relate some of the problems of space travel and the resultant stress on the human body. Make a report to the class on your findings.

27. Stage a short play showing how a great medical discovery was made.

28. Write a paragraph starting with "I would (would not) like to become a doctor because. . . ."

29. Look up the various functions of the glands. Make a poster showing pictures which depict the work of the different glands. (Example: a child crying; an athlete sweating.) Use the poster to report to the class.

THE SYSTEMS OF THE BODY:

WHAT THEY ARE AND WHAT THEY DO

General Information

1. Name several ways in which the human body is like a machine.

   (a) Both perform work.
   (b) Each part has its own job.
   (c) Parts work together to keep the body alive as machine parts work together to make it run. (Skin and paint protect, food and gasoline used as fuel.)
   (d) If not properly cared for, both wear out and break down.

2. How does the human body differ from a machine?

   (a) If a part of a machine breaks down it can be replaced but many parts of the body cannot be replaced. (A discussion here could take place about transplants, artificial organs and limbs, and so on.)

   (b) Many parts of the body are continually being replaced as older portions die. (Hair, teeth, skin.)

   The body can heal itself. (Broken bones, small cuts.)

3. Study the facts on cells and then state what percentage of each of the following is found in the human body.

Oxygen	65%	Calcium	1½%
Carbon	18%	Phosphorus	1 %
Hydrogen	10%	Other elements	1½%
Nitrogen	3%		

   (These elements combine in many ways to form thousands of compounds. Some compounds, such as vitamins, harmones, and enzymes, are present in extremely small amounts. But they are all essential for good health, or even for life.)

4. What percentage of the human body is made up of water?

   Water makes up 70% of the human body.

5. What is meant by the term "organ"?

   An organ is a part of the body composed of several tissues which performs a certain specific function.

6. Name several organs of your body.

   The stomach, heart, mouth and arteries are all organs.

7. Name several paired organs.

   The lungs, eyes, kidneys and ears are paired organs.

8. What do we mean by systems of the body?

   The systems of the body are comprised of several organs working together to perform a specific task. Example: the heart, veins, arteries, and capillaries work together to circulate blood.

Cells: The Body's Building Material

1. All living things are made of tiny units, called cells.

2. The human body is made of billions of cells.

3. These cells are microscipic in size. A drop of blood this big--o--contains 5,000,000 red blood cells and 5,000 white blood cells.

4. Cells are of many shapes.

5. A cell needs food and oxygen to live.

6. A cell gets rid of waste material.

7. The cells contain:

   water fats starch calcium, bone cell
   protein sugar iron, red blood cells mineral salts

8. Cells differ in the type of work that they do.

9. Some cells of the body manufacture and maintain the material that forms bones and cartilage.

10. Some cells change into non-living parts of the body. (Hair and nails)

11. A group of like cells that perform a particular kind of work is called a tissue. Groups of cells that transmit impulses back and forth from the brain to other parts of the body make up nerve tissue.

12. When different kinds of tissues are organized to perform a particular kind of work within a body, the tissues form an organ. An eye is an organ that performs the function of seeing.

13. Organs of the body are organized into unified systems. Each system performs a particular task for the body. The digestive system, which includes the mouth, teeth, tongue, gullet, stomach, intestines and many glands, performs the function of digesting food.

<u>Suggestions to the teacher</u>:

Each of these facts could be assigned to a group of students. Perhaps a pantomime could be arranged for the next day in class. This might be a good device to depict a certain cell's function. The class must guess which fact about the cell they are pantomiming.

AND/OR

Written fact sheets, posters, and oral reports could be made showing the work of cells.

TESTS

Introduction and General Information

I. Today we no longer believe a statement to be true simply because someone says that it is true. We investigate, test, and draw conclusions before accepting it. This is the scientific way. Write "S" before those statements which are expressions of the scientific way of thinking and doing.

S 1. John has fallen and hurt his foot. The doctor x-rays his foot to see if any bones are broken.

___ 2. Aunt Emma buries a bag of snails in the shade of an oak to help cure her hay-fever.

S 3. Robert must spend eight years studying under trained men before he can become a medical doctor.

___ 4. Mary shivered and her cousin told her that a rabbit must have run over her future grave.

S 5. Vesalius examined the human skeleton very carefully and learned all the bones.

S 6. Columbus believed that the earth was round and that his journey would prove it.

S 7. Dr. Beaumont in 1822 persuaded Alexis St. Martin to become an experimental animal. In an accident St. Martin's stomach had been pierced and a permanent hole was left. Dr. Beaumont used this opening to observe the workings of a stomach.

___ 8. If your mother ate rabbit stew before you were born you will be a fast runner.

II. Write true or false in front of each statement. If the statement is false, write the correct statement below.

T 1. The human body is like a machine in many ways.

F 2. Galen's explanation of the circulatory system was correct.

F 3. Galen dissected many human corpses before he recorded his findings.

T 4. As paint protects a car, so skin protects our body.

F 5. No part of the body can be replaced if it breaks down.

T 6. The body can sometimes heal itself but a machine cannot.

T 7. Over half of the body is composed of water.

T 8. All living things are made from tiny units, called cells.

F 9. A cell does not need anything from the environment to live.

F 10. All cells perform the same work.

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F 9. A cell does not need anything from the environment to live.

F 10. All cells perform the same work.

F 11. The systems of the body are completely independent of one another.

III. In front of the items in Column A place the correct letter from the items in Column B. Chose the one that **best** fits.

Column A	Column B
d 1. Circulatory	a. Cell
b 2. Stomach	b. Organ
b 3. Ear	c. Tissue
b 4. Lung	d. System
c 5. Lining of the stomach	
b 6. Heart	
a 7. Building block of body	
d 8. Digestive	
c 9. Group of cells performing special work	
d 10. Respiratory	

The Skeletal-Muscular System

1. What makes up the skeletal-muscular system?

   The system is composed of 206 bones and 650 muscles.

2. What are some of the functions of this system?

   (a) The bones support the softer parts of the body and give the body its general shape.
   (b) The bones help to protect the softer parts of the body.
   (c) The muscles help in movement.
   (d) The inner parts of some bones make blood cells.
   (e) Bones are the body's chief storage place for calcium, a chemical element very important to the sound health of the body.

3. If we had no ribs what would happen if someone bumped into us?

   Our lungs might collapse or the heart become damaged.

4. What is the structure of a bone?

   (Use cutaway view of a bone.) Dense outer material gives bone shape and strength made mostly of calcium and phosphorus.

   Soft inner part, called marrow, is storage depot for fat.

5. Name some other bones that protect.

   Spinal column protects the spinal cord.
   Bony sockets in front of the skull protect the eyes.

6. What is the cranium and what is its purpose?

   The round part of the skull that encases the brain is the cranium.

7. What is the skull?

   The skull includes twenty-nine bones that make up a human head.

8. How are the bones connected?

   Two kinds of joints--ball and socket joint (shoulder)
   hinge joint (knee)
   Cartilage--a kind of very tough, springy tissue which holds together bones that do not move.
   Ligaments--thick cords of tough, stringy tissue which join movable joints.

9. How are the muscles attached to the bones?

   The muscle is attached to the bone by a short, tough cord called a tendon. A typical muscle is thick in the middle and tapers gradually toward the ends. The ends of a muscle are attached to bones. One end of a muscle is anchored to a bone that the muscle does not move. This attachment is called the <u>origin</u> of the muscle. The other end of the muscle is attached to a bone that the muscle is intended to move. This attachment is called the <u>insertion</u> of the muscle.

10. What are the differences between <u>voluntary muscles</u> and <u>involuntary muscles</u>?

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10. What are the differences between <u>voluntary muscles</u> and <u>involuntary muscles</u>?

    Voluntary muscles are the muscles that move the skeleton which we can move at will.

Involuntary muscles are the muscles over which we have no control such as the muscles found in the walls of veins and arteries, stomach. Goose flesh is caused by tiny muscles pulling hair erect.

11. Write a short imaginative descriptive paragraph on a body from outer space.

12. What are some of the major bones found in the body and where are they found?

The student may list these in a written or oral report.

TEST

Skeletal - Muscular System

I. Circle the number in front of the statements that are functions of the skeletal-muscular system.

(1) The bones support the softer parts of the body and give the body its general shape.

2. The muscles help the athlete play his favorite sport.

(3) Bones are the body's chief storage place for calcium.

(4) The inner parts of some bones make blood cells.

5 The muscles support the bones.

II. Completion: Fill in the necessary word or words that best complete the following sentences.

1. The [spinal][column] protects the spinal cord.

2. The [cranium] is the part of the [skull] that protects the brain.

3. The type of joint that is found at the shoulder is a [ball] and [socket] joint

4. A [hinge] joint is the type of joint found at the knee.

5. A kind of very tough, springy tissue that holds bones which do not move together is called [cartilage].

6. [Ligaments] are thick cords of tough, stringy tissue that hold bones together at movable joints.

7. The [femur] is the name of the thigh bone.

8. The [humerus] is the name of the upper arm bone.

9. [Ribs] are the bones which protect the heart and lungs.

10. [Pelvic] bones are found in the lower abdomen and are the base for the attachment of the leg bones.

11. [Tendon] is a short, tough cord by which a muscle is attached to a bone.

III. The following actions are controlled by muscular movement. Tell whether it is voluntary or involuntary. Put "I" for involuntary and "V" for voluntary.

Involuntary muscles are the muscles over which we have no control such as the muscles found in the walls of veins and arteries, stomach. Goose flesh is caused by tiny muscles pulling hair erect.

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I 1. When you are chilled or frightened goose flesh appears.

V 2. You stand and stretch.

V 3. My eyes follow a moving object.

I 4. The pupil of my eye contracts in bright light.

I 5. My heart pumps blood continuously.

I 6. Food is moved from the stomach to the small intestine.

V 7. I touch a hot piece of metal.

V 8. Jane is the fastest runner in her class.

The Circulatory System

1. What does the word circulatory mean?

   Circulatory means movement around.

2. What is the function of the circulatory system?

   It moves the blood through the body.

3. The organs of the circulatory system are listed below. Give the purpose of each.

   Heart--a very efficient pump that moves blood through the body.

   Arteries--carry blood from the heart to all parts of the body.

   Veins--return blood from the body to the heart.

   Capillaries--extremely small blood vessels connecting arteries and veins. (They lie close to almost all the cells of the body.)

4. What is the function of the blood of the body?

   It carries food, oxygen and waste products to and from the cells of the body. Blood contains cells that fight disease and substances that repair cut or bruised parts of the body.

5. Why do the cells need food and oxygen?

   They will die without these things.

6. About how many quarts of blood are pumped by your heart every day and how many times a day does your heart contract and relax?

   13,000 quarts of blood every day.
   100,000 heartbeats every day

7. Of what is the blood made up?

   The blood is made up of Plasma--the liquid part; red and white corpuscles, little bodies--the solid parts; Platelets--particles which cause clotting.

8. What are red corpuscles?

   They are small disc-shaped solids in the blood that contain hemoglobin. The compound of iron helps carry the oxygen from the lungs to cells in all parts of the body.

9. Why is blood running out of a cut always red?

   When hemoglobin combines with oxygen it turns bright red.

10. What is anemia?

    It is the lack of red corpuscles.

11. What is the function of the white corpuscles?

    Disease is caused by an over-abundance of harmful bacteria within the body, and it is the function of the white corpuscles to destroy bacteria. To destroy a bacterium, a white cell moves to the bacterium and then engulfs it. Once the bacterium is inside the white cell, it is digested.

12. What is the function of the platelets?

    They are the particles in the blood that are responsible for clotting. Students may examine recent cuts to witness this action.

*13. The walls of the arteries are usually much thicker and more elastic than the walls of the veins. Explain this difference. When you feel a pulse, are you pressing a vein or an artery?

*14. The circulatory system is sometimes called the body's transportation system. Explain why this description is accurate. What are some materials carried by this system?

*15. The functions of the digestive, respiratory and circulatory systems are closely related. Explain how they function together in keeping the body in good working order.

*These questions might lend themselves well to class discussions in depth.

The Respiratory System

1. What are the functions of the respiratory system?

   The system brings air into the body and removes carbon dioxide through the process of breathing.

2. Why does the body need air?

   The cells of the body need oxygen, and the oxygen is obtained from the air. Energy is the combination of nourishment and oxygen.

3. How does carbon dioxide form in our bodies?

   It forms as a waste product when foods are broken down.

4. What is the difference between external respiration and internal respiration?

   External--is the exchange of oxygen and carbon dioxide in the lungs.

   Internal--the intake of oxygen by the individual cells of the body and the release of carbon dioxide.

5. The organs of the respiratory system are listed below. Give the functions of each.

   Nose--breathes in air.

   Larynx--or voice box is the passageway for air to travel from nose to trachea.

   Trachea--or windpipe is a tube which carries air downward. It splits into two bronchi. Each bronchus leads to a lung.

   Lungs--oxygen from the air enters the blood and carbon dioxide leaves it through the walls of the lungs.

6. What happens to the carbon dioxide in the lungs?

   It passes through the air passages and then out of the body through the nose.

7. How do the muscles of the chest and diaphram aid the respiratory system?

   They contract to enlarge the chest. The lungs are pulled out by the enlarged chest and the lungs suck in air.

*8. What is meant by the statement that gases are exchanged in the lungs?

*9. How is the respiratory system dependent on the circulatory system?

*10. How is the respiratory system dependent on the skeletal-muscular system?

*These questions might afford good discussion topics.

<u>The Circulatory and Respiratory Systems</u>

I. True-False: If the statement is false then write the correct statement. If the statement is true place a "T" before the sentence.

___ 1. The respiratory system's only function is to bring air into the body. False: It also removes carbon dioxide.

__T__ 2. Since energy is a combination of nourishment and oxygen, when we run we need more oxygen; therefore, we breathe deeper.

__T__ 3. Carbon dioxide is considered a waste product in our bodies.

__T__ 4. The nose is one of the organs of the respiratory system.

___ 5. The respiratory and muscular system are not in any way dependent upon each other. False: the respiratory system is dependent upon the diaphragm, a muscle, to draw in air.

___ 6. The function of the blood is to move the circulatory system around the body. False: the circula-

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___ 6. The function of the blood is to move the circulatory system around the body. False: the circulatory system's function is to move the blood. The blood moves food, carbon dioxide, and oxygen.

___ 7. Harvey discovered the telescope. False: he was the scientist who discovered and wrote about the circulation of the blood.

___ 8. The same blood is never used twice by the heart. False: blood makes a never-ending circle through the body and the heart.

_T_ 9. The arteries help the heart move the blood.

_T_ 10. There is an exchange of gases in the lungs.

II. Matching: Choose an item from Column B and place its letter in front of the item in Column A that best matches.

Column A	Column B
_c_ 1. Tube for carrying air	a. white corpuscles
_e_ 2. Muscle which aids the respiratory system	b. hemoglobin
_h_ 3. Gas formed as a waste product	c. trachea
_b_ 4. Compound of iron needed to carry oxygen	d. oxygen
_d_ 5. Gas needed by the cells to live	e. diaphragm
_k_ 6. Liquid part of blood	f. platelets
_g_ 7. Lack of red corpuscles	g. anemia
_a_ 8. Cells in bloos that destroy bacteria	h. carbon dioxide
_f_ 9. Particles in blood responsible for clotting	i. hydrogen
_l_ 10. Principal organs of breathing	j. red corpuscles
	k. plasma
	l. lungs
	m. liver
	n. gall

III. Please answer the following in complete sentences.

1. Explain the difference between internal and external respiration.

2. How is the respiratory system dependent on the circulatory system?

The Digestive System

1. What does <u>digestion</u> mean?

Blood carries nourishment to the cells of the tissues. This nourishment comes from the food we eat. Food which we put into our mouths can not be carried by the blood; therefore it must be greatly changed. This process is called <u>digestion</u>.

2. What are the three functions of the digestive system?

(a) It prepares the food so the cells can use it.
(b) It absorbs the food into the body.
(c) It eliminates any material that cannot be absorbed.

3. What is the alimentary canal?

   The alimentary canal is a continuous tube about thirty feet long that is the main part of the digestive system. It is enlarged in some areas, the stomach, and coiled, the small intestine, in others. It extends from the mouth to the anus.

4. Below are listed the organs of the digestive system in the order in which digestion takes place. Give the function of each.

   Mouth--opening and cavity to receive food.

   Teeth--break and tear food into small pieces.

   Salivary glands--pour saliva into mouth which moistens the food and starts digestion by means of chemicals called enzymes.

   Esophagus--the passage for food from mouth to stomach.

   Stomach--a storehouse for food which produces enzymes that digest certain foods.

   Pancreas and small intestine--produce enzymes that break down foods into small particles.

   Liver--produces bile, a liquid which contains certain waste products and chemicals that may help the intestine absorb fats.

   Gall bladder--stores the bile until it is needed for digestion.

   Small intestine--cells in the wall of this organ absorb the small particles of food. Blood carries this absorbed food to all parts of the body.

   Large intestine--absorbs water from the material that can not be absorbed. This makes material more solid.

   Rectum--moves the solid waste out of the body through the anus, an opening.

Activity suggestion:

   Have cut-outs of each organ and an empty figure. Call on a student to come to the front of the class. The student is given an organ. He must identify it, tell what it does, and pin it on the empty figure in about the right spot.

TEST

The Digestive System

I. True or False: If the statement is false, write the correct statement. If the statement is true, place a "T" before the sentence.

T 1. Blood carries nourishment to the cells of the tissues.

___ 2. This nourishment comes from the air we breathe. False: It comes from the food we eat.

___ 3. The food we eat does not have to be changed to be brought to the tissues. False: It must be changed both chemically and physically.

T 4. Absorbing food into the body is one of the functions of the digestive system.

___ 5. The alimentary canal is a straight, narrow tube through the body. False: It is enlarged in some areas and coiled in others.

T 6. The trachea is part of the alimentary canal and is the tube which leads from the mouth area to the stomach.

II. In one sentence tell how each of the following aids in digestion:

1. Teeth

2. Salivary glands

3. Mouth

4. Pancreas

5. Liver

III. Arrange the following in order as they are used in digestion and tell what each does.

stomach, small intestine, rectum, esophagus, large intestine

1.

2.

3.

4.

5.

The Urinary or Excretory System

1. What is the function of the urinary system?

   It removes urea and other waste products from the body in liquid urine.

2. What causes the formation of waste products?

   Undigested food, dead cells and carbon dioxide form waste products.

3. How do these waste products get to the kidneys?

   They go from cells into the blood stream and the blood carries the waste products to the kidneys.

4. The organs of the urinary system are listed below. Give the function of each.

   Kidneys--removal of waste products and water from the blood. Special cells in the kidneys return some water and other materials to the blood.

   Ureters--passages to carry liquid from kidney to bladder.

   Bladder--stores urine.

   Urethra--canal through which urine is discharged from the bladder.

The Nervous System

1. What is the function of the nervous system?

   It regulates the activities of all the other systems.

2. What are the two main divisions of the nervous system?

   The central and the peripheral are the main divisions.

3. What is the function of the brain in the nervous system?

   The brain controls the functions of different parts of the body and controls activities such as appetite, emotions, memory, and temperature.

4. What makes up the peripheral nervous system?

   The peripheral nervous system consists of thirty-one pairs of nerves that leave the spinal cord and twelve pairs of nerves that connect the brain with various parts of the body. These parts include the eyes, nose, ears, lungs, heart, and digestive system.

5. What does the somatic portion of the peripheral nervous system regulate?

   It regulates muscles that move at will.

6. What does the autonomic nervous system regulate?

   It regulates activity of many organs that are not controlled by the conscious mind such as stomach, bladder, heart, and so forth.

7. The specialized parts of the nervous system are the sense organs. Tell what special job each does.

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   Eyes--enable us to see.
   Ears--pick up sound waves and give us a sense of balance.

Nose--is the organ by which man can detect odors.
Taste buds--respond to chemicals in food.
Other sense organs--respond to sensations of pain, touch, heat and cold.

The Reproductive System

1. What is the function of the reproductive system?

   Reproductive system enables living things to reproduce themselves.

2. What are the cells in the female and male called that are concerned with reproduction?

   Female--egg cells
   Male--sperm cells

3. What happens when a sperm cell comes in contact with an egg cell?

   The sperm cell is absorbed by the egg cell. This absorption causes the egg cell to begin to reproduce itself by splitting in two. This continues until the billions of cells form an embryo. Embryo is the name given to a baby during its first few months of development in the mother's body. Later, the developing infant is called a fetus.

4. How long does it take for a baby to be reproduced?

   It generally takes nine months.

5. What is the uterus?

   The Uterus is the organ in the mother's body which conceives, develops, and protects the baby until birth.

The Glands

1. What is a gland and what is its function?

   A gland is a group of cells working as a unit to manufacture some substance which the group itself does not use, but which the rest of the body needs.

2. How do the exocrine glands work?

   The exocrine glands secrete their substances through small tubes to the skin or to the inner surfaces of hollow organs. They make tears, sweat, digestive juices.

3. Name several exocrine glands and locate them on a chart. Give the function of each.

   Salivary--aid digestion.

   Pancreas--aid digestion.

   Lacrimal (tear)--make tears; cleanse eyes.

   Sweat--air-conditions body.

   Mammary--make milk to feed young.

4. How do the endocrine glands work?

   They empty their secretions into the blood stream.

5. Locate the following endocrine glands and give their function.

Pituitary is near the brain just above the mouth and influences body growth and metabolism.

Thyroid is found at the bottom of the front of the neck and regulates growth.

Parathyroid is located on the thyroid gland and increases calcium content of the blood.

Adrenal are located on top of the kidneys and help the body adjust to sudden stress and help regulate salt and sugar balances in body.

Ovaries are found on either side of the lower part of the abdomen in women. They regulate the changes of the development of the whole female tract and produce an ovum.

Testes are in a sac of skin outside and in front of the lower part of man's body. They act on all parts of a man's body and manufacture the spermatozoon which fertilizes the female ovum.

TEST

Urinary, Nervous, and Reproductive Systems and the Glands

I. Choose the answer that best completes the following. Circle the letter before the correct answer.

1. The function of the urinary system is:

a the formation of waste products.
(b) the removal of waste products.
c the making of carbon dioxide.
d the completion of digestion.
e all of the above are correct.

2. The organs of the urinary system are:

a the liver, gall bladder, and bladder.
b the stomach, the liver, and the urethea.
(c) the kidneys, the bladder, and the ureters.
d none of the above are correct.

3. Formation of waste products is caused by:

a undigested food.
b dead cells.
c carbon dioxide.
(d) all of the above.

4. The function of the nervous system is to:

(a) regulate all the activities of the other systems.
b make us nervous.
c help with movement.
d all of the above are correct.

5. The reproduction cycle in the human animal:

a begins a new life when the female egg is fertilized by the male sperm.
b takes about nine months to be completed.
c makes it possible for the race to continue.

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b takes about nine months to be completed.
c makes it possible for the race to continue.
(d) all of the above are correct.

6. A gland is:

a a tissue used by the digestive system.
b a part of the circulatory system.
(c) a group of cells manufacturing substances needed by the body.
d none of the above is correct.

II. Matching: Choose an item from Column A that best matches an item in Column B. Place the letter before the statements in Column A.

Column A	Column B
f 1. A gland which influences growth	a. Uterus
d 2. The body's air-conditioning gland.	b. Adrenal
a 3. Organ for carrying the unborn child.	c. Mammary
h 4. Organ used for seeing.	d. Sweat
c 5. Glands which secrete milk to feed the young.	e. Pituitary
g 6. Gland which secretes juices necessary for digestion.	f. Thyroid
b 7. Gland which aids the body in movements of stress.	g. Pancreas
j 8. Known as the body's filtering system.	h. Eyes
	i. Ears
	j. Kidney
	k. Liver
	l. Bladder

BIBLIOGRAPHY

Taken from the AAAS Science Book List

The designations are "P" for primary or very simple, "I" for intermediate, and "A" for advanced. A few books, given dual designations to indicate a broader range of appeal that would normally appear in a secondary school or an adult list, are included among those designated "A" because they are needed by academically-talented and science-oriented children. Starred books are definitely in the parish library. The others may be.

Beckhard, Arthur J., and William D. Crane. Cancer, Cocaine and Courage: The Story of Dr. William Halsted. Messner, 1960. Pp. 191. LB $2.99, net. (A)

Calder, Ritchie. The Wonderful World of Medicine. Garden City, 1958. Pp. 70, illus. $2.95.
Striking illustrations and a historically oriented text chronicle man's search for knowledge about himself as a living organism and for knowledge of ways to combat his diseases, prolong his life, and make the world a more healthful place in which to live. There is an incidental description of a day in the life of a modern doctor and mention of world-wide health organizations and of space medicine. (I)

Clapesattle, Helen. The Mayo Brothers. Houghton, 1962. Pp. 180 illus. LB $2.20, net.
The author of the more detailed adult biography, The Doctors Mayo, has written this special account for young people. The reader can learn much from the exceptional experiences of the Mayos. (I)

Cooper, Lettice. The Young Florence Nightingale. Roy, 1960. Pp. 140 illus. $3.00 net.
A lively narrative of the childhood of this famous pioneer in the nursing profession.

Coy, Harold. Doctors and What They Do. Watts, 1956. Pp. 183. $3.95.
A narrative account of the work of a practicing physician--his office calls, his home visits, his diagnostic procedures and conferences, his performance of surgery. Doctors are seen at work in hospitals and clinics--even dealing with sick minds. This illuminating overview of a challenging profession is supplemented by an outline of the educational requirements and curricula, and will serve as good basic guidance material for interested young people. (A)

Dodge, Bertha S. The Story of Nursing. Little, 1954. Pp. 243 illus. $3.50.
An excellent portrayal of this exacting and rewarding profession. Offers historical background and tells about the opportunities in private, institutional and public-health nursing. (A)

Dolan, Edward F., Jr. Vanquishing Yellow Fever: Walter Reed. Britannica, 1962. Pp. 192 illus. LC $2.36, net.
Walter Reed, who already had made a reputation for his work in eradicating typhoid fever, was sent to Cuba in 1900 as the head of a United States Army Commission instructed to wipe out yellow fever. This is the story of how Reed and his brave associates discovered the cause and carried out their orders.

Douty, Esther M. Patriot Doctor: The Story of Benjamin Rush. Messner, 1959. Pp. 192 illus. $2.95, net.
Insights into the practice of medicine during the American Revolution are revealed through this life story of a patriot who signed the Declaration of Independence and humanitarian who served as a front-line doctor. His book on diseases of the mind and his development of occupational therapy have labeled Rush the "Father of American Psychiatry."

Eberle, Irmengarde. Edward Jenner and Smallpox Vaccination. Watts, 1962. Pp. 153 illus. $2.95.
Jenner was chosen for the Immortals of Science series because of his discovery of vaccination as a preventive against smallpox. His is a story of battling against prejudice, ill fortune, and ridicule to achieve his goal. (A)

_____. Modern Medical Discoveries. Rev. ed. Crowell, 1960. Pp. 184 illus. $3.00
Tells how such life-saving therapeutic agents as penicillin, recent vaccines, vitamin extracts, cortisone and sulfa drugs were discovered and perfected so that they now prevent the spread of disease and save thousands of lives. (I)

Elting, Mary. The First Book of Nurses. Watts, 1951.n.p., illus. $2.50
A small, attractive story-book introduction to nursing. Mentions famous nurses' caps, and nurses in other countries. (I)

Elwell, F. R., and J. M. Richardson. Science and the Doctor. Criterion, 1959. Pp. 160 illus. $3.50.
A clear insight into the life and work of a "family doctor," or general practitioner, as he meets his patients, makes calls, and prescribes medicines--and his instruments and techniques as they have developed over the years. Good background information for older children. (A)

Farmer, Laurence. Master Surgeon: A Biography of Joseph Lister. Harper, 1962. Pp. 141 illus. $2.92, net.
Primarily devoted to Lester's career as a surgeon and research worker and to his battle to recognize and correct sources of infection. It tells also of his Quaker background, education, and family life. (A)

Goldberg, Herbert S. Hippocrates: Father of Medicine. Watts, 1963. Pp. 107. $2.95.
Describes medicine four thousand years before Christ and shows how Hippocrates transformed medical practice from quackery into science. His versatility and genius are made evident in this absorbing narrative. (A)

Hume, Ruth Fox. Great Men of Medicine. Rev. ed. Random, 1961. Pp. 192 illus. $3.50.
Biographical sketches of ten of the leading figures in the history of medicine, including Vesalius, Paré, Koch, Morton, Lanennec and Pasteur. This Landmark Book concludes with a brief note on medical research and the future. (A)

Marcus, Rebecca B. William Harvey: Trailblazer of Scientific Medicine. Watts, 1962. Pp. 127 illus. $2.95.
Harvey originated the study of human physiology through his discoveries and explanations of bodily processes, though he is best known as the first scientist to probe and demonstrate the circulation of blood. (A)

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A beginning history of medicine moving forward with the changing background of the life and times of each

major worker; provides excellent serious and dramatic reading. (A)

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This history of the war against poliomyelitis begins with the earliest case on record, mentions some famous persons who have been afflicted and shows how the progress of medical research gradually laid the foundation for the work of Salk and others who were able to develop preventatives. (I)

Anatomy and Physiology

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The human body is a complex biochemical machine. A noted biochemist has written this easy introduction to the chemical reactions that are essential functions of the body. The roles of enzymes, vitamins and hormones are described simply. (A)

Asimov, Isaac. The Human Body: Its Structure and Operation. Houghton, 1963. Pp. 340 illus. $5.95.
First, the reader learns where man stands in the classification of living things, then, chapter by chapter, he is informed about the human skeleton, muscles, and the major systems: respiratory, circulatory, digestive, excretory, and reproductive. Written primarily for the layman and secondary school student, it has a place in elementary libraries for older students and for teachers. (A)

Cosgrove, Margaret. Wonders of Your Senses. Dodd, 1958. Pp. 64 illus. $3.00.
Covers the same subject matter as Aliki's book, but in a more detailed and technical narrative for older children. Discussions of the senses of some animals, and other topics. (I)

Ets, Marie Hall. The Story of a Baby. Viking, 1939. Pp. 63 illus. $4.00.
The illustrations are based on the series of human embryos arranged by the Loyola University School of Medicine and exhibited at a Century of Progress, Chicago, 1933-34. The author-artist conferred with doctors, nurses, and mothers and visited maternity hospitals to make her work authoritative. The best book for children on this subject in print. (I)

Fletcher, Helen Jill. For Junior Doctors Only. Bobbs, 1961. Pp. 96 illus. $2.95.
An elementary discussion of the human body, by systems. More detailed than Ravielli's book, but not as appealing. For younger readers for whom the books of Asimov and Sproul are too advanced. (I)

Glemser, Bernard. All About the Human Body. Random, 1958. Pp. 136 illus. $1.95.
Although less attractive than some other books on the subject, this elementary human anatomy and physiology book is textually good because it is organized according to major bodily functions: eating, breathing, thinking, moving, and using the senses. Good diagrams of organs. (I)

Lauber, Patricia. Your Body and How It Works. Random, 1962. Pp. 76 illus. $2.19, net.
A basic presentation of how the human body functions through its major systems. A good preliminary treatment that will interest a child in other more detailed books.

Levine, Milton I., and Jean H. Seligmann. A Baby is Born: The Story of How Life Begins. S. and S., 1949. Pp. 54 illus. $1.99.
An introduction to human embryology written especially for children by a medical doctor and his wife. The text has received the approval of clergy of various religious faiths. (I)

Ravielle, Anthony. Wonders of the Human Body. Viking, 1954. Pp. 125 illus. $2.62, net.
An outstanding illustrator and author has written a fundamental book on human anatomy. The functional approach to anatomy will appeal especially to young boys. (I)

Riedman, Sarah R. Your Blood and You; the Story of Your Circulation. Rev. ed.
The human circulatory system described in terms of its evolution, and the gradual acquisition of knowledge through scientific research. Related accounts of blood diseases, blood types, transfusions, and so forth, are given. More advanced than the similar work by Weart. (A)

Schneider, Leo. Lifeline: The Story of Your Circulatory System. Harcourt, 1958. Pp. 127 illus. $2.95.
Describes the human blood in terms of its composition, circulation, function as a transportation system for food and waste, and defense action against infection. Scientist who have contributed significantly to our knowledge of the circulatory system are mentioned briefly. (I)

Sproul, Edith E. The Science Book of the Human Body. Watts, 1955. Pp. 232 illus. $4.95.
Illustrated human anatomy and physiology, written especially for students by a physician. Less detailed and scholarly than the counterpart by Asimov, but more appealing to younger persons. (A)

Weart, Edith Lucie. The Story of Your Brain and Nerves. Coward, 1961. Pp. 63 illus. $2.86, net.
An enlightening introduction to the anatomy and physiology of the human central nervous system, with a glossary of technical terms, and a helpful index. (I-A)

Wilson, Mitchell A. The Human Body and How It Works. Golden, 1959. Pp. 140 illus. $4.99, net.
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Zim, Herbert S. What's Inside of Me? Morrow, 1952. Pp. 32 illus. $2.60, net.

A very simple introduction to salient features of human anatomy which small children can read or which their parents can share with them. Contains supplemental information for the further enlightenment of parents and teachers. (P)

Zim, Herbert S. Your Heart and How It Works. Morrow, 1959. Pp. 64 illus. $2.78, net.
A simple yet explicit description of the human heart and its functioning, accompanied by an examination of the human circulatory system and its role. Lacks index. (I)

Other books that are available at the East Baton Rouge Parish Library.

Dietz, David. All About Great Medical Discoveries. E. M. Hale and Company, 1960. Pp. 134 illus. (I)
Traces the history of great medical discoveries from ancient time to present discoveries. Each chapter is a separate story yet the narrative thought is continuous. High interest value and excellent index.

Follett, Robert J. R. Your Wonderful Body. Follett Publishing Co., 1961. Pp. 26 illus.
Designed for the primary grades, this small book takes the young reader through all the systems of the body. The illustrations are simple but descriptive. There is a page of things to do at the end of the book and a list of vocabulary words. (P)

Gallant, Roy A. Man's Reach into Space. Doubleday and Co., 1964. Pp. 151 illus.
Another fine book by a well-known space expert, this work tells of the problems that must be overcome if a man's body is to survive the stress of space travel. (A)

Keen, Martin. The How and Why Wonder Book of the Human Body. Grosset and Dunlap, 1961. Pp. 48 illus.
Tells in a systematic way the most important things scientists and physicians have learned about the human body. (I-A)

Lent, Henry A. Man Alive in Outer Space. Macmillan, 1961. Pp. 147 illus.
This is the story of the men behind America's first man-in-space. The Air Force calls them "space surgeons." Over the years, these skilled and courageous doctor-scientists have been at work, in their laboratories and in the air, to help man achieve his age-old dream of reaching for the stars. (I-A)

Riedman, Sarah. How Man Discovered His Body. International Publishers Co., 1947. Pp. 122 illus.
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Filmstrips (East Baton Rouge Parish Schools Catalog 1964)

1939, 2187 Circulatory System

1937, 2188 Digestive System

1940, 2189 Glandular System

2569, Kinds of Cells

1941, 2190 Nervous System

1938, 2191 Respiratory System

2640 Louis Pasteur

2644 William Harvey

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117 It's the Brain That Counts
79 Mechanisms of Breathing
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296 Cell: Structural Unit of Life
363 The Human Machine
524 Wonder of Our Body
522 The Wonder of Reproduction

Other Visual Aid Material

Instructor Teaching Aids. F. A. Owen Publishing Co., Dansville, New York. 14437.

Human Body Kit. Number 650. Complete Kit $19.50

This kit provides everything needed for a successful study of the human body. Material supplements the health curriculum in middle and upper grades and may be used with any text. The ten large-size charts (20½" x 28½") are striking visual aids that present accurate detailed drawings of different parts and systems of the body in color. Included are The Body, Skeleton, Muscles, Nerves, Brain, Glands, Senses, Respiration, Circulation, Digestion.

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VOCABULARY

Definitions taken from Webster's New World Dictionary, College Edition.

Alimentary Canal--the passage in the body that food goes through; it extends from the mouth through the esophagus, stomach and intestines to the anus.

Artery--any one of the system of branching tubes carrying blood from the heart to all parts of the body; distinguished from vein.

Capillary--any of the tiny blood vessels connecting the arteries with the veins.

Cartilage--a tough, elastic, whitish animal tissue; gristle: the skeletons of embryos and young animals are composed largely of cartilage, most of which later turns to bone.

Cell--in biology, a very small unit of protoplasm usually with a nucleus and an enclosing membrane: all plants and animals are made up of one or more cells.

Circulation--the movement of the blood in the veins and arteries throughout the body.

Cranium--(1) the skull. (2) the bones forming the enclosure of the brain, excluding the lower jaw; brainpan.

Embryo--an animal in the earliest stages of its development in the uterus: the human organism in the first three months after conception is called an embryo, thereafter a fetus.

Endocrine--(1) designating or of any gland producing one or more internal secretions that are carried by the blood or lymph to some part whose functions they regulate or control. (2) any such gland or its secretion: the thyroid, adrenal, and pituitary glands are endocrines.

Enzyme--any of various organic substances that are produced in plant and animal cells and cause changes in other substances by catalytic action: as, pepsin is a digestive enzyme.

Esophagus--the passage for food from the pharynx to the stomach; gullet.

Gall bladder--a membranous sac attached to the liver, in which excess gall or bile is stored and concentrated.

Gestation--the act or period of carrying young in the uterus from conception to birth.

Hormone--a chemical substance formed in some organ of the body, as the adrenal glands, the pituitary, etc., and carried to another organ or tissue, where it has a specific effect.

Ligament--a band of tough tissue connecting bones or holding organs in place.

Muscle--any of the body organs consisting of bundles of fibers that can be contracted and expanded to produce bodily movements.

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Muscle--any of the body organs consisting of bundles of fibers that can be contracted and expanded to produce bodily movements.

Organ--in animals and plants, a part composed of several tissues and adapted to the performance of some action.

Pancreas--a large, elongated gland situated behind the stomach and secreting a digestive juice (pancreatic juice) into the small intestine: groups of differentiated cells (islands of Langerhans) in the gland produce the hormone insulin: the pancreas of animals, used as food, is also called sweetbread.

Peripheral--outer; external; distal.

Rectum--the lowest segment of the large intestine, extending, in man, from the sigmoid flexure to the anus.

Respiration--act or process of respiring; breathing; inhaling and exhaling air.

Salivary gland--a gland that secretes saliva, the thin, watery, slightly viscid fluid which serves as an aid to digestion by moistening and softening food, and contains as enzyme, ptyalin, which converts starch to maltose.

Skeleton--the hard framework of an animal body for supporting the tissues and protecting the organs; specifically, all the bones collectively, or the bony framework, of a human being or other vertebrate animal.

Somatic--of the framework or outer walls of the body, as distinguished from the viscera.

Tendon--any of the inelastic cords of tough, fibrous connective tissue in which muscle fibers end and by which muscles are attached to bones or other parts; a sinew.

Testicle--the sex gland of the male.

Thyroid--designating or of a large ductless gland lying in front and on either side of the trachea and secreting the harmone thyroxine, which regulates the growth of the body: the malfunctioning or congenital absence of this gland can cause goiter, cretinism, etc.

Tissue--(1) the substance of an organic body or organ, consisting of cells and intercellular material; (2) any of the distinct structural materials of an organism, having a particular function: as, epithelial tissue.

Trachea--in the respiratory tract of vertebrates, that part which conveys air from the larynx to the bronchi; windpipe.

Urine--in mammals, the yellowish fluid containing urea and other waste products, secreted from the blood by the kidneys, passed down the ureters to the bladder, where it is stored, and periodically discharged from the body through the urethra.

Uterus--a hollow, muscular organ of female mammals in which the ovum is deposited and the embryo and fetus are developed and protected; womb.

Vein--any blood vessel that carries blood from some part of the body back to the heart.